

**ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО
ОБРАЗОВАНИЯ
«САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ
УНИВЕРСИТЕТ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ, МЕХАНИКИ И
ОПТИКИ»**

Факультет безопасности информационных технологий
Кафедра проектирования и безопасности компьютерных систем

Дисциплина:
«Операционные системы»

**ОТЧЕТ О ВЫПОЛНЕНИИ
ЛАБОРАТОРНОЙ РАБОТЫ №4**

Выполнил:
Студент гр. N3247 Гаврилова В. В.
Проверил:
Ханов А. Р.

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Задание:

Провести тестирование и найти лучший планировщик ввода-вывода среди других

Выполнение:

1) Перекомпилируем ядро

```
#sudo apt install build-essential libncurses5-dev fakeroot xz-utils
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
build-essential is already the newest version (12.9).
build-essential set to manually installed.
fakeroot is already the newest version (1.25.3-1.1).
fakeroot set to manually installed.
xz-utils is already the newest version (5.2.5-1.0).
The following additional packages will be installed:
  libncurses-dev
Suggested packages:
  ncurses-doc
The following NEW packages will be installed:
  libncurses-dev libncurses5-dev
0 upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
Need to get 345 kB of archives.
After this operation, 2 414 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://mirror.truenetwork.ru/parrot rolling/main amd64 libncurses-dev amd64 6.2+20201114-2 [345 kB]
Get:2 https://mirror.yandex.ru/mirrors/parrot rolling/main amd64 libncurses5-dev amd64 6.2+20201114-2 [345 kB]
Fetched 345 kB in 1s (284 kB/s)
Selecting previously unselected package libncurses-dev:amd64.
(Reading database ... 236896 files and directories currently installed.)
Preparing to unpack .../libncurses-dev_6.2+20201114-2_amd64.deb ...
Unpacking libncurses-dev:amd64 (6.2+20201114-2) ...
Selecting previously unselected package libncurses5-dev:amd64.
Preparing to unpack .../libncurses5-dev_6.2+20201114-2_amd64.deb ...
Unpacking libncurses5-dev:amd64 (6.2+20201114-2) ...
Setting up libncurses-dev:amd64 (6.2+20201114-2) ...
Setting up libncurses5-dev:amd64 (6.2+20201114-2) ...
Processing triggers for man-db (2.9.4-2) ...
Scanning application launchers
Removing duplicate launchers or broken launchers
Launchers are updated
```

```

#sudo apt install linux-source-5.10
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bison flex libfl-dev libfl2 linux-config-5.10
Suggested packages:
  bison-doc flex-doc qtbase5-dev
The following NEW packages will be installed:
  bison flex libfl-dev libfl2 linux-config-5.10 linux-source-5.10
0 upgraded, 6 newly installed, 0 to remove and 0 not upgraded.
Need to get 123 MB of archives.
After this operation, 126 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:2 https://ftp.acc.umu.se/mirror/parrotsec.org/parrot rolling/main amd64 bison amd64 2:3.7.5+dfsg-1 [104 kB]
Get:1 http://mirror.truenetwork.ru/parrot rolling/main amd64 flex amd64 2.6.4-8 [440 kB]
Get:5 https://ftp.acc.umu.se/mirror/parrotsec.org/parrot rolling/main amd64 linux-config-5.10 amd64 5.10.0-6parrot1 [672 kB]
Get:6 https://mirror.yandex.ru/mirrors/parrot rolling/main amd64 linux-source-5.10 all 5.10.28-6parrot1 [1 MB]
Get:3 https://euro3-emea-mirror.parrot.sh/mirrors/parrot rolling/main amd64 libfl2 amd64 2.6.4-8 [103 kB]
Get:4 http://mirror.truenetwork.ru/parrot rolling/main amd64 libfl-dev amd64 2.6.4-8 [104 kB]
Fetched 123 MB in 19s (6 532 kB/s)
Selecting previously unselected package flex.
(Reading database ... 236986 files and directories currently installed.)
Preparing to unpack .../0-flex_2.6.4-8_amd64.deb ...
Unpacking flex (2.6.4-8) ...
Selecting previously unselected package bison.
Preparing to unpack .../1-bison_2%3a3.7.5+dfsg-1_amd64.deb ...
Unpacking bison (2:3.7.5+dfsg-1) ...
Selecting previously unselected package libfl2:amd64.
Preparing to unpack .../2-libfl2_2.6.4-8_amd64.deb ...
Unpacking libfl2:amd64 (2.6.4-8) ...
Selecting previously unselected package libfl-dev:amd64.

```

```

#ls /usr/src/
broadcom-sta-6.30.223.271
linux-config-5.10
linux-headers-5.10.0-6parrot1-amd64
linux-headers-5.10.0-6parrot1-common
linux-kbuild-5.10
linux-patch-5.10-rt.patch.xz
linux-source-5.10.tar.xz
realtek-rtl88xxau-5.6.4.2~git20210118
virtualbox-guest-6.1.18

```

```

#cp /usr/src/linux-source-5.10.tar.xz ~/kernel
[root@cyberknopa-virtualbox]-(~/kernel)
#cd ~/kernel
[root@cyberknopa-virtualbox]-(~/kernel)
#ls
linux-source-5.10.tar.xz

```

```

#cp /boot/config-5.10.0-6parrot1-amd64
arch/          drivers/      Kconfig
block/         fs/           kernel/
certs/         .get_maintainer.ignore lib/
.clang-format .gitattributes LICENSES/
.cocciconfig  .gitignore   .mailmap
COPYING        include/     MAINTAINERS
CREDITS        init/        Makefile
crypto/        ipc/         mm/
Documentation/ Kbuild       net/

```

```

#cp /boot/config-5.10.0-6parrot1-amd64 .config
[root@cyberknopa-virtualbox]-(~/kernel/linux-source-5.10)

```

```

#make menuconfig
UPD      scripts/kconfig/mconf-cfg
HOSTCC   scripts/kconfig/mconf.o
HOSTCC   scripts/kconfig/lxdialog/checklist.o
HOSTCC   scripts/kconfig/lxdialog/inputbox.o
HOSTCC   scripts/kconfig/lxdialog/menubox.o
HOSTCC   scripts/kconfig/lxdialog/textbox.o
HOSTCC   scripts/kconfig/lxdialog/util.o
HOSTCC   scripts/kconfig/lxdialog/yesno.o
HOSTLD   scripts/kconfig/mconf

WARNING: unmet direct dependencies detected for ADI_AXI_ADC
Depends on [n]: II0 [=m] && HAS_IOMEM [=y] && OF [=n]
Selected by [m]:
- AD9467 [=m] && II0 [=m] && SPI [=y]

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.

```

```

.config - Linux/x86 5.10.28 Kernel Configuration
> I/O Schedulers
      I/O Schedulers
      Arrow keys navigate the menu.  <Enter> selects submenus ---> (or empty submenus ----).
      Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes, <M> modularizes
      features.  Press <Esc><Esc> to exit, <?> for Help, </> for Search.  Legend: [*]
      built-in [ ] excluded <M> module < > module capable

      [*] MQ deadline I/O scheduler
      <*> Kyber I/O scheduler
      <*> BFQ I/O scheduler
      [*] BFQ hierarchical scheduling support
      [*] BFQ IO controller debugging

```

- 2) Перекомпилируем ядро
 - make clean
 - make deb-pkg LOCALVERSION=-custom KDEB_PKGVERSION=
 (makekernelversion)-1
- 3) Подождем 3 ~ часа
- 4) Возьмем скрипт для тестирования

Kyber

```
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=1 time=1.01 ms (warmup)
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=2 time=3.95 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=3 time=3.70 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=4 time=3.73 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=5 time=3.84 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=6 time=4.96 ms

--- /root/second_space (ext4 /dev/sda2 20.0 GiB) ioping statistics ---
5 requests completed in 20.2 ms, 5 MiB read, 247 iops, 247.8 MiB/s
generated 6 requests in 1.01 s, 6 MiB, 5 iops, 5.96 MiB/s
min/avg/max/mdev = 3.70 ms / 4.04 ms / 4.96 ms / 469.5 us
```

None

```
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=1 time=955.8 us (warmup)
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=2 time=3.23 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=3 time=3.15 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=4 time=3.72 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=5 time=3.86 ms
1 MiB <<< /root/second_space (ext4 /dev/sda2 20.0 GiB): request=6 time=3.73 ms

--- /root/second_space (ext4 /dev/sda2 20.0 GiB) ioping statistics ---
5 requests completed in 17.7 ms, 5 MiB read, 282 iops, 282.7 MiB/s
generated 6 requests in 1.00 s, 6 MiB, 5 iops, 5.97 MiB/s
min/avg/max/mdev = 3.15 ms / 3.54 ms / 3.86 ms / 221.6 us
```

- 6) Выводы: планировщик bfq обладает наибольшей скоростью чтения (если не считать none, который для ssd), быстрее всего исполнялись запросы deadline и none.